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ABSTRACT

The tasks of this paper are to suggest, first, the general nature of future-oriented change needed in higher education, and second, the outline of a model for the systematic analysis and syntheses of that change. The author feels that although administrators are aware of what is going on in higher education, they are largely ignorant or disagree about why the educational programs are such as they are. Thus, he believes that higher education must become more goal oriented, both in graduate and undergraduate education. The process of goal analysis and objectives development can and should work in two directions at once: from the level of global goals toward particulars, and from the level of particulars toward the global. Constant assessment of programs and institutions as a whole are needed to determine where education is going and why. (HS)

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NOTES ON A CHANGE MODEL FOR HIGHER EDUCATION: A HEURISTIC PROPOSAL

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The history of American education is a record of innovation: of the evolution of the common school and mass public education, of the distinctively American college and university. That history also is a record of fads and fashions, of the emergence and decline of heroes and panaceas. Except for the "transformation of the school" under Dewey's influence (Cremin, 1962), more a matter of style than of structure, the pattern of American education virtually was established by 1900. We have tinkered with minor mechanisms and devices, but we have not undertaken a global reappraisal of the educational process, nor a fundamental remodeling of it. More specifically, in this century, while scholars have described and criticized other social institutions down to the last paper clip and punch card, a comparably thorough evaluation of higher education has not emerged. We have not applied our tools to our own enterprise.

The tasks of this paper will be to suggest, first, the general nature of future-oriented change needed in higher education, and second, the outline of a model for the systematic analysis and synthesis of that change.

I will not review the charges of irrelevancy brought against us by students and journalist critics. On our own evidence, we are hard put

to justify either the general shape or the specifics of undergraduate education in terms of distinctive outcomes in the work careers of our students. And in graduate education we are not much better off. We know what we are doing, but we largely are ignorant or disagree about why we are doing it. Far too often, our justifications are little more than appeals to Cardinal Newman's century old idea of the university or to the pragmatic concerns of the century old Morrill Act.

Scholars of the state of society and of education urge on us a proactive role. Lancelot Law Whyte (1968) claims that we are in the midst of "the critical moment of a radical human transformation, first in attention and awareness, and subsequently in conscious thought and action [p. 25]." We are moving, Whyte says, from the separatism of fragmented disciplines to a global attention and awareness, though not yet significantly into conscious thought and action. More specifically, Alvin Toffler (1971) argues that American education is an "ingenious machine constructed by industrialism to produce the kind[s] of adults it needed [p. 400]." But the time-bias and consequent mechanisms appropriate to an industrializing society are inadequate to the emerging technotronic era: "For education the lesson is clear," Toffler says, "its prime objective must be to increase the individual's 'cope-ability' --the speed and economy with which he can adapt to continual change [p. 403]."

Paul Weiss (1969) holds that the separatist tradition, emphasizing specialization and technical expertise, has produced "a mass of single-track workers . . . draining interest, attention, encouragement, and talent away from solitary prospecting ventures. . . . Breadth is given up in favor of depth, and universality and versatility are traded for

the thrust of concentrated effort [p. 19]." The upshot of a century of separatist, specialized, and problem-solving oriented education, John Platt (1970) argues, is that while our environment has become frighteningly diverse in the alternatives we are required to sift and sort, education has become frighteningly narrow in preparing us for the task.

> Nowhere are we as diverse as we might be. Science and technology today encompass thousands of specializations, yet it is easy to see that the specialists are probably overconcentrating on certain subjects while other subjects, of equal interest and importance and ripeness for development, are almost entirely neglected [p. 3].

That neglect is nowhere more evident than in our failure to subject our own institution to disciplined inquiry. One result of our neglect, Platt says, is that "the student is not taught how to be broad and human because the faculty frequently does not know how to be broad and human [p. 20]."

These indictments are possible and plausible, I believe, first because our goals are unclear and disintegrated, and second because we do not ensure systematically the cohesiveness, consistency, and effectiveness of our ends and means. We assert the value of liberal education, yet often pursue it by patently illiberal means. We claim that the university is the manufactory and storehouse of knowledge, yet diversity and versatility often are the victims of standardization. We proclaim the unifying power of education, yet guard our disciplinary boundaries jealously. And many of us show real fear of tampering with our established habits of thought and action.

Responding proactively to the indicments brought against us, as I perceive the task, entails two considerations: First, to identify the

salient characteristics of institutions as such. Second, to suggest a systematic means to identify and achieve future-viable ends for our institution.

A principal source of the difficulty of change, I believe, is an almost endemic misunderstanding among academics of the necessary characteristics of complex organizations. I assume we all agree that colleges and universities are inherently complex organizations. What, then, are the critical characteristics of complex organizations with respect to changing them?

Herbert Simon (1960) argues persuasively that complex organizations "are almost universally hierarchical in structure [p. 40]." They are divided and subdivided into units, each with an independent and semi-autonomous function, the coordinate total of units and functions constituting the whole. This is observable in micro-organisms, macro-organisms, and ecosystems. "The near universality of hierarchy in the composition of complex systems," Simon says, "suggests . . . something fundamental in this structural principle that goes beyond the peculiarities of human organization [p. 41]." Of possible structures of a given size and complexity, the hierarchical is most likely to appear by evolution because it is highly efficient, and requires the least transmission of information among its subdivisions.

Acceptance of Simon's hypothesis does not solve the difficulty of changing complex organizations, but I submit that the acceptance is prerequisite to the solution. Further considerations are prerequisite even to understanding a complex organization as it is. Each organization or type of organization must be examined with respect to its unique

characteristics; in particular, the degree and types of centralization and decentralization appropriate to the purposes and size of the organization, the forms and flow of information required by the purposes and functions of the organization, and the forms, degrees, and flow of authority appropriate to the purposes and strucutre of the organization (Simon, 1960, pp. 43-49).

Thus, the intent to change higher education entails a systematic analysis, of particular institutions and institutional systems, in terms of their purposes and functions. The analysis provides the data needed to design a new synthesis, either to effect present purposes better or to effect new purposes.

The purposes of an organization also may be called aims or goals; the latter term is adopted here. A goal-seeking model may be stated thus: Clearly stated, objectively determinable goals are the source of objectives, the realization of which constitute attainment of the goals. Clear, determinable objectives are the source of strategies, the use of which can realize the objectives. The model is completed by feedback that checks the system for consistency and effect (adapted from Banathy, 1968; Mager, 1962, 1972).

If a goal is ambiguous and indeterminable, objectives cannot be deduced from it consistently; allegedly associated objectives and strategies are only accidentally, if at all, related to the goal. For example, Robert Hutchins (1954) once wrote, "The aim of liberal education is human excellence . . . [p. 28]." The goal is laudable, no doubt. But even if we could translate the term 'human excellence' into determinable objectives, the outcome is so remote in time from the formal educational process as to be almost useless as feedback on the viability

of the goal; today's excellent student, at least slightly too often, is tomorrow's inept parent, practitioner, or president.

A properly stated goal implies what to look for to discover whether the goal is attained. "Broad statements of intent," Robert Mager (1972) says, "can be achieved only to the degree that their meaning is understood, to the degree that you will know one when you see one [p. vi]." Mager describes a process of goal analysis, "useful in helping you to describe the meaning of the goals you hope to achieve, whether these goals deal with attitudes, appreciations, or understandings[p. vi]." The process is value free; it does not decide which goals are desirable, which not, but which are fuzzy, which meaningful. The exposition is deceptively brief, written primarily for school and business people. The absence of pedagese and scholarly paraphenalia should not put off academics. Goal analysis is a recipe for educational survival.

The complete procedure can be summarized briefly, in five steps reminiscent of Dewey's paradigm of inquiry:

Step One: Write down the goal.

Step Two: Jot down, in words and phrases, the performances that, if achieved, would cause you to agree that the goal is achieved.

Step Three: Sort out the jottings. Delete duplications and unwanted items. Repeat Steps One and Two for any remaining abstractions(fuzzies) considered important.

Step Four: Write a complete statement for each performance, describing the nature, quality, or amount you will consider acceptable.

Step Five: Test the statements with the question, If someone achieved or demonstrated each of these performances, would I be willing to say he has achieved the goal? When you can answer yes, the analysis is finished. (Mager, 1972, p. 72).

Obviously, that simply stated procedure, applied to higher education,

would become very complex--yet, if we cannot, how are we to justify in any strict sense what we do, and ask or require our students to do? I will suggest a solution of the dilemma later.

Is it necessary to analyze every goal to its last measure of meaning? "No." Magers says, "Only those goals that are important to achieve, or to achieve better. . . . you put yourself in a better position to move things in your direction if you know what that direction is [p. 132]." The procedure is designed to get out the "fuzzies," the indeterminable abstractions, for those goals that we cannot afford not to attain.

The process of goal analysis and objectives development can, indeed should work in two directions at once: from the level of global goals toward particulars, and from the level of particulars toward the global. At the global level, analysis is concerned with viable, as distinct from merely euphonius or politic goal statements for whole institutions, and for constituent colleges, schools, and departments. At the particulars level, analysis is concerned with viable objectives for courses, laboratories, seminars, and independent studies. Coordination of evolving goals and objectives is necessary, of course. If we conceive goal analysis and objectives development as essentially an R & D process, we are on familiar ground, at least methodologically. Two examples may show the possibilities of the process.

Reuel Denney and Frances Sydow (1972-73) draw upon the history of science to derive a goal concept, in the form of a root metaphor, for the changing curriculum. The scientific revolution of the seventeenth and eighteenth centuries was based upon attention to primary qualities, the abstraction of physical, mechanical essentials from the vast

confusion of sensuous, secondary qualities, in order to understand the commonalities of phenomena underlying their differences. The challenge of the scientific revolution to then conventional thought, "carried in print, set up a mode of skeptical atomistic and associationist thought that shaped the nineteenth century positivistic period . . . [p. 56]."

American education, its pattern largely established in the nineteenth century, echoes not only the demands of industrialization, but also the positivistic mode of the period. Now the pattern is challenged, not only by the emerging demands of the technotronic era, but also by the renaissance of the subjective mode, characterized by attention to secondary qualities. "One challenge to teachers today," say Denney and Sydow, "is how to replace . . . the one-sided Newtonian-Gutenberg model of education . . . [to] create institutions where teachers and students are more engaged in response to sensuous experience than before [p. 56-57]."

Yet we do not want to lose the productive impetus of the rational-empirical mode; it accounts for the remarkable growth of physical and natural scientific understanding in the eighteenth and nineteenth centuries, and also for the birth and growth of the behavioral sciences, principally since the mid-nineteenth century. Again, say Denney and Sydow, the history of science is instructive. A significant organizing concept of the twentieth century scientific revolution is complementarity, a principle introduced by Niels Bohr in 1927 into atomic physics, purportedly to resolve apparent contradictions, for example, that light is both wave and particle (Popper, 1965, pp. 100-101). As an operational concept, complementarity may transcend Bohr's strictly theoretical formulation of it; for example, the physiologist, Georg

von Bekesy, relieved the strain of periods of intense empirical study by taking his lunch to a gallery or museum, where he studied paintings and sculptures, a complementary activity "which helped to teach him not only physiology, but also the observational skills of the artist . . . ." The chemist, Thomas Blackburn, uses "part of his laboratory hours to encourage students to keep notebooks on the colors, smells, and textures of their compounds." Complementary modes of insight, Blackburn finds, tend to lead students into broader questioning. "In short, what may appear to be mutually interfering modes of cognition are in fact complementary (Denney & Sydow, 1972-73, p. 57)."

A minor curricular revolution already is visible. Denney and Sydow cite increasing emphasis on field work in marine sciences, in part in response to the popularity among young people of surfing, scuba diving, and boating--activities that are sensuously, intrinsically, and independently satisfying, and which have lead participants into systematic interest in oceanography, marine biology, and more recently aquaculture. These students retain the essentially humanistic sense of wonder, of excitement at <u>all</u> the qualities of phenomena, that was characteristic of the scientifically valuable small horde of amateur naturalists of the eighteenth and nineteenth centuries--the preference for "prospecting ventures," for breadth and universality and versatility, the loss of which in the rush for technical competence and rapid production is so deeply regretted by Weiss (1969).

Denney and Sydow recommend the complementary mode as an informing, structuring goal concept for curriculum. "We envision," they say, "a class where the topic of light and color is approached by studying how they were understood and imagined in the Orient and in antiquity, in

the Middle Ages and in our own time . . . ." And we need also, "seminars for and by the faculty with the purpose of their own re-education to meet the demands of our time (Denney & Sydow, 1972-73, pp. 58-59)." Thus, a goal of higher education might be a broad awareness, appreciation, and understanding of the complementarity of primary commonalities and secondary diversities, and of the power of the complementary mode of thought.

The operational equivalent of a goal statement is an objective, or more likely a set of objectives. Eric Olson (1972-73) proposes a course titled, "Mechanisms, Devices, and Systems: An Introduction to the Art of Turning Enigmas into Problems." The general objective of the course is "to develop skill in speculation in situations where opportunities for feedback exist [p. 62]." The strategy requires students, by examination, manipulation, hypothesis, and testing hypotheses, to achieve and demonstrate understanding of how to attack enigmatic novelties.

For example, a student is given an opaque cubical box, having a crank on one side, a wheel on top. Turning the crank clockwise turns the wheel; turning the crank counterclockwise does not turn the wheel. The task is to derive alternative, plausible hypotheses on the internal construction of the box, then to test the hypotheses by examining the internal mechanism. The student might be asked further to produce different effects, for example, to increase the speed of the wheel by a factor of two [p. 63].

Olson's proposal illustrates the use of complementarity as an instructional concept, pooling in the pursuit of full understanding the practical function, experience, the theoretical function, hypothesis,

and the critical function, testing. "The intellectual task of transferring theoretical principles into understanding of a specific device," Olson says, "is often extraordinarily difficult because there are practical as well as conceptual barriers." Learning by exploring, by means of an immediate transaction of speculation and experience, "often nearly impossible for an unaided individual, could be made feasible, exciting and productive in a structured learning environment [p. 64]."

These two examples, of the organizing goal concept, complementarity, and the objective, transactional speculative experience, themselves complementary, illustrate that the coordination of goals and objectives is not inordinately difficult, for limited purposes. The greater difficulty consists in applying the process to the diversity and complexity of higher education. But as Simon notes, organizational diversity and complexity may be managed by judicious decisions about which functions require centralization of decision making, which decentralization.

The decision mechanism typical in higher education is a many runged ladder of advisory committees, authority residing principally at higher management levels. But Simon argues, "Hierarchy always implies intrinsically some measure of decentralization. . . . a balancing of the [cost-time] savings through direct local action against the losses [attributable to locally] ignoring indirect consequences . . . (1960, p. 44)."

Highly diversified businesses and industries tend to decentralize "program" decisions to intermediate levels, grouping activities related to a set of similar products or services in a semi-autonomous department.

Policy decisions affecting the whole organization tend to be centralized, grouping, for example, all labor-management activities in a single department of industrial relations.

The policy-program distinction, as a means to determine decision levels, seems especially appropriate to higher education. Statutory or chartered authority and responsibility, residing in the administration and regents or trustees, entails centralization of decision making, but not necessarily all decision making. General policy surely must be a centralized function, but the range of centralized decisions may not need to be very great; that is a subject for systematic inquiry.

Program decision making may be considerably decentralized. Central authority ultimately must participate in deciding whether an institution can or cannot, should or should not institute or maintain certain programs. But programs and curricula most directly affect "producers," that is, a faculty presumably expert in some definable area of study, and "consumers," that is, students presumably desiring to become knowledgeable in the area of study. The goal and objective examples cited earlier might have been generated by a faculty of physical sciences. The decision of the faculty, to establish certain goals and objectives, should be sufficient; those goals and objectives should define the program and curriculum in physical sciences. The proof of the pudding would follow directly. Any significant cases of indigestion surely would be apparent. If the faculty of physical science invented a very good recipe, other faculties might add it to their diets. As methodology has generalized from one discipline to many--subject to critical appraisal, of course--so also might goals and objectives.

In a comprehensive university, the distinction between policy and

program decision making would operate at several levels. Certain policy decisions affect the entire institution; others affect only a single college, school, or department. Similarly, certain program decisions affect only one department; others of greater generality a school, a college, or possibly the entire institution. Decisions abouts modes and levels of academic governance are amenable to systematic inquiry (see, e.g. Baldridge, 1971a, 1971b).

Systematic approaches to decision making, in the form of disciplined methodology, have developed rapidly in little more than a decade. "In our present state of knowledge," Arnold Kaufmann (1968) says, "we are far from claiming that a science of action . . . can be defined properly [p. 10]." However, the burgeoning literature does provide tested models for decision making in a variety of settings, under a variety of conditions (see, e.g. Cronbach & Gleser, 1969; Kaufmann, 1968).

Contemporary decision theorists tend to be modest in their claims. For example, Kaufmann says, "My purpose is to encourage the reader to use, whenever he can, the exact sciences in practical situations, and . . . to open up wider horizons for considering the question of translating his intentions into criteria of effectiveness [p. 11, italics added]." On the question of our need for a science of decision making, theorists tend to take a strong stand:

> The acceleration of history, the flexibility of structures, man's essential mobility, produce a continuous reassessment of ideas. . . . in every group of which they will be members, our children will soon become familiar with models and diagrams which will help them to understand the mechanisms of the world. They will perhaps be better able than we to project hypotheses into the future . . . . They will learn how to construct . . . models of action, . . . to draw up representations of those models, so as to be able to communicate satisfactorily with others . . . . Then, perhaps, this

> disturbing world, this dangerous and exciting world which we foresee, will be more easily controlled because it will be better understood (Kaufmann, 1968, p. 12).

Meanwhile, this disturbing world invades our studies with insistent demands for reform of our enterprise. We can employ the art of decision making, while participating in the generation of its science. The complexity of higher education can be broken down into approachable components, each with some internal commonality, comprising a limited number of functions, and therefore a limited number of alternative possible structures, goals, and objectives. "This principle of partition," Kaufmann says, "has become all but universal and we cannot do without it if we are to understand the increasingly intricate structures of the modern world [p. 14]."

The ubiquitous computer, with which we already explore masses of data as great in magnitude as that required for analysis and synthesis of the purposes and processes of higher education, can manage our task--once the massive subject is partitioned into rational, manageable components.

The task is large and difficult. But we are accustomed to cracking hard nuts, and enjoying their fruits--though examining ourselves may be the hardest nut of all. Looking at ourselves as subjects, and acting on our diagnoses and prescriptions, implies a strong trust climate. Too often, in my experience at least, the gross inefficiencies and insufficiencies of our decision making are attributable, in large part, to lack of trust, to fear that someone, somewhere in the tangled chain of academic management, will put one over on the rest of us. If mistrust and fear are the principal defenses against change, our situation is <u>much</u> worse than I perceive it to be.

Primitive man construct legends and myths to allay their fears of what they do not understand. We cannot afford that luxury. In the technotronic era, we must understand, because we must act, constantly. "In the high-interaction society," John Platt (1970) argues, "all of us must have a say in decisions that affect our destiny [p. 111]." The keys to participation are communication and choice--informed communication and collective choice about our future. "The lesson of our times," Platt says, "is this new demand for a kind of collective formation of our own future [p. 117]." Our choice of a future cannot rest on unexamined legends and myths which our society has outgrown; it must rest on the systematic assessment of where we are going, and why.

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